

REMARKS

1. In response to the final Office Action mailed October 22, 2004, Applicant respectfully requests reconsideration. Claims 19-28 were last presented for examination. All the outstanding claims were rejected. By the foregoing Amendments, claims 19-28 have been canceled and new claims 29-52 have been added. Thus, upon entry of this paper, claims 29-52 will be pending in this application. Of these 24 claims, three (3) claims (claims 29, 37 and 45) are independent. Based on the above Amendments and following Remarks, Applicant respectfully requests that the outstanding objections and rejections be reconsidered, and that they be withdrawn.

Art of Record

2. Applicant acknowledge receipt of form PTO-892 listing additional references identified by the Examiner.
3. Applicant acknowledge receipt of the form PTO-1449 filed by Applicant on August 2, 2004, which has been initialed by the Examiner indicating consideration of the references cited therein.

Examiner Interview

4. Applicant thanks the Examiner for the substantive interview conducted at the USPTO on March 22, 2005, and the various phone interviews and conversations held in April, 2005. The agreements reached in the above interviews are set out in the following Remarks.

Amendments

5. As noted, Applicant has canceled all pending claims and replaced them with new claims 29-52.
6. In accordance with agreements reached in the above-noted interviews, the new independent claims recite that, for any and all of electrodes of the claimed electrode array, the spacing between adjacent electrodes changes in a uniformly graduated manner along the length of the electrode array. As seen from FIG. 2 of Applicant's application, a

“uniformly graduated change” in spacing between adjacent electrodes refers to a generally regular change in inter-electrode spacing along the length of the electrode array.

7. As described in Applicants’ specification, receptors are regularly spaced along the length of the outer wall of the scala tympani. In contrast, due to the three-dimensional spiral of the cochlear, the change in relative positioning of the organ of Corti and the inner wall of the scala tympani along the length of the cochlear, and the fact that the receptors are composed of neural structures which extend radially inward from the organ of Corti, the spacing between receptors on the inner wall of the scala tympani gradually decreases toward the modiolar center of the cochlear. As shown in FIG. 2 of Applicant’s application, the noted uniformly graduated change in spacing between adjacent electrodes of Applicant’s claimed invention provides for the development of electrode arrays having inter-electrode spacing which corresponds to this spacing between selected adjacent receptors along the inner wall of the scala tympani.

Claim Rejections

8. The previously pending claims were rejected based on a variety of references, each of which was discussed in detail during the above-noted interviews. Because all pending claims have been canceled, the outstanding rejections are rendered moot. However, in accordance with the Examiner’s request, and to facilitate prosecution, Applicant summarizes below reasons why the new claims are patentable over the previously applied references.

9. Hochmair-Desoyer. This reference teaches that one pair of electrodes from the same channel are spaced at 1.5mm , while the spacing between two consecutive contacts of different channels is 0.5mm. This alternating spacing is provided between all electrodes of the electrode array. As discussed in the Interviews, there is no teaching or suggestion that the spacing between adjacent electrode arrays of this reference change in a uniformly graduated manner along the length of the electrode array, as recited in Applicant’s new claims.

10. Fu and Shannon. This reference describes investigations that were conducted by the authors directed to the effects of location and spacing of electrodes on speech performance. In one experiment, Experiment III, seven different four-electrode processors were designed with uneven electrode spacing to simulate the effect of an irregular pattern of nerve activation. (See, page 323, col. 1.) Specifically, both electrode spacing and locations were adjusted to produce conditions ranging from equal tonotopical spacing (P6 of Fig. 1) to equal linear frequency intervals (P0 of Fig. 1). As shown in Fig. 1 of the reference, none of the Experiment III conditions include uniformly

graduated inter-electrode spacing. Nor is there any suggestion to test or implement such an arrangement. In fact, it appears that the reference teaches away from non-uniform spacing of electrodes. The discussion of the results of the experiments indicate that the non-uniform spacing experiment (Experiment III) yielded results which were not as encouraging as the experiments (Experiments I and II) in which different arrangements of uniform electrode spacing were explored.

11. Hochmair Patent. This reference teaches selectively positioning or placement of the electrodes on device whereby the device will stimulate the cochlea in accordance with the frequency response and to provide a selected frequency response when the device is inserted into the cochlea (See, col. 2, lns. 8-11; col. 2, lns. 20-23; and col. 5, lns. 60-62.) At most, such a teaching implies differing inter-electrode spacing; it does not teach or suggest spacing the electrodes of the electrode array such that the spacing between adjacent electrodes changes in a uniformly graduated matter.

12. In prior actions, it was asserted that the Hochmair patent teaches a multi-electrode cochlear implant and method of making the implant in which the spacing of electrodes is closer together at the apical end of the cochlear than at the basal end of the cochlear to provide a selected frequency response. Applicant respectfully disagrees with such an interpretation of this reference. The Hochmair patent discloses that there is a frequency response difference between apical and basal ends; it does not suggest that the spacing at the opposing ends should be different. The patent does not suggest that the receptors at one end are denser than at the other end, nor that the electrodes should match that difference in density. Nor is there any teaching or suggestion that the receptors at the denser region be given preference when designing an electrode as compared to the receptors at the opposing end of the cochlear. Finally, there is no teaching or suggestion to provide an arrangement of electrodes in which the spacing between adjacent electrodes changes in a uniformly graduated matter, as recited in Applicants' new claims above.

13. At least one prior action included the contention that it would have been obvious to modify the Hochmair patent to use spacing between electrodes that is either different in different regions of the electrode array or uniformly graduated to achieve the benefit of positioning the electrodes closer together at the apical end of the implant than at the basal end in order to provide a selected frequency response as taught by the Hochmair patent. Applicant respectfully disagrees that the stated objective "to provide a selected frequency response" would provide the motivation for modifying this reference. The fact that a desired but undefined frequency response is the objective (as it always is) does not suggest a particular distribution of electrodes.

14. At least one prior action included the observation that applicant does not disclose that different or graduated electrode spacing provides any criticality and/or unexpected results over any

other spacing pattern in which the electrodes are merely closer together at the apical end of the implant than at the basal end. It appears the invention will perform equally well with any similar electrode spacing. As such, the determination of the most specific spacing pattern by routine experimentation would, therefore, be *prima facia* obvious to one skilled in the art. Applicant respectfully disagrees. As noted, uniformly graduated spacing of electrodes enables one to produce an electrode array having electrodes which are spaced in a manner that corresponds to the spacing of receptors along the inner wall of the scala tympani. Such a positional correspondence may provide superior speech recognition by the recipient, as described in Applicant's application. (*See*, Applicant's application, pg. 4.)

Dependent Claims

15. The dependent claims incorporate all of the subject matter of their respective independent claims and add additional subject matter which makes them a *fortiori* and independently patentable over the art of record. Accordingly, Applicant respectfully requests that the outstanding rejections of the dependent claims be reconsidered and withdrawn.

Conclusion

16. In view of the foregoing, this application should be in condition for allowance. A notice to this effect is respectfully requested.

Respectfully submitted,



Michael G. Verga
Reg. No. 39,410

April 22, 2005